OBSERVATIONS ON THE HABITS OF OXYBELUS SERICEUM ROBERTSON

(Hymenoptera: Sphecidae)

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The discovery of a large nesting site of *Oxybelus sericeum* Robertson two miles northwest of Goleta, Santa Barbara County, California, made possible a number of interesting observations on the behavior of this wasp. The nest area extended along a strip of sand bordering a lagoon back of the ocean. This area was approximately 150 feet long by two feet in width and contained many hundreds of nests. The primary study extended over a 23 day period from June 23 to July 15, 1959, and additional observations were made more than a month later. Wasp activity began at about 8:00 a.m. Pacific Standard Time on a clear day and at about 9:00 a.m. on a day with low overcast of fog. Activity tapered off about 4:00 p.m. and ceased at 5:00 p.m. High daily temperature during this time ranged between 75°F. and 83°F.

Nest-building.—A typical burrow is constructed in moist, solid sand, free of vegetation. It is about 90 mm. deep, 3 mm. in diameter, straight down and terminating in 1-4 cells in a cluster. The female burrows into the sand head first, pushing the sand out of the hole with her hind legs as she proceeds. The cells are unlined oval chambers about 9 mm. long. The female takes about two hours to complete a burrow and one cell, after which she smooths the sand pushed out of the nest entrance and flies off for provisions.

After the first cell is provisioned the female goes head first into the burrow, closing the entrance behind her with sand which is apparently excavated from a second cell. Occasionally, over a two hour period sand is forced from the entrance. Then the female emerges head first, smooths the area around the entrance and flies away for more provisions. Ordinarily a nest will be completed over a period of two days, and a female will build several nests in her lifetime.

Provisioning.—The observed prey in 16 cells involving five separate nests and more than 200 flies were exclusively ephydrids, *Ephydra riparia* Fallen (identified by W. W. Wirth). These flies were abundant on the surface of the brackish lagoon adjacent to

the nesting site. However, a variety of other flies of similar size were numerous in the area. Female *Oxybelus* were observed many times lighting on the sand near the nest, the paralyzed fly held by the hind legs of the wasp. The female straddled the fly which was ventral side up, facing forward, and extending well behind the body of the wasp. Portal to portal provisioning time averaged about two minutes, and 15-25 seconds were consumed in placing the fly in a nest. The cells examined had 10 to 20 paralyzed flies with an egg laid on the prosternum of the first prey member placed in the cell. Including mating activities described below, a single cell was provisioned in about 45 minutes.

Mating.—Many males were seen in the area about flowers and lighting on the sand of the nesting site. At all times there appeared to be an excess of males over females. Before starting a burrow a female mates, copulation taking place on the sand with the male in the superimposed position for 15 to 30 seconds. During this period the male uses his antennae to tap his mate on her face, rapidly but intermittently. If disturbed the pair may separate or will fly a few inches away. After completion of the burrow and one cell, a female again pairs off with a male, who takes a position on the sand near the nest entrance and strikes at any insects approaching it, including dipterous parasites, pompilids, bembicids, and rival male *Oxybelus*. Each time the female arrives at the nest with prey the male jumps on her and copulation takes place. Exceptions to this routine occur when the male is defending the nest and the female may proceed directly into the burrow. Occasionally, a female hesitates upon leaving the nest and mating takes place under these circumstances, also.

Marking experiments indicated that females are monogamous while provisioning a particular cell, but the male disappears while she is constructing a new cell. She then pairs off with a new mate. In one case a female completed a nest with four separate males and the following day started a new nest with the help of the original male. It was estimated that normal nest-building activity for a female might involve 50 or more periods of copulation in a day.

Larvae.—Length of larval life was not observed, but several cocoons were found. These were fashioned of agglutinized sand grains.

Parasites.—Small miltogrammine sarcophagids were always in association with the wasps. They continually buzzed around the females and occasionally struck them in what appeared to be larviposition. Several cells were found with parasitic maggots or puparia which were reared to adults identified by H. J. Reinhard as *Senotainia litoralis* Allen.

Seasonal History.—At the time of the first observations, June 23, all stages of *O. sericeum* from egg to adult were found at the breeding site. Activity continued at a high rate through July 15. The site was revisited August 20 and the colony appeared to be even more vigorous. This leads to the supposition that there are a series of overlapping broods during the warmer months. Previous California records taken from Bohart and Schlinger (1957) give a collecting span from June 19 to September 1.

Discussion.—A brief summary of *Oxybelus* biology was given by Bohart and Schlinger (1957). Krombein (1955) described the subspecies *crocatum* of *sericeum* and gave the following biological note based on observations of H. E. Evans, the collector. "Dr. Evans writes that these specimens were taken on a small beach of white sand along the Gulf (Pascagoula, Mississippi), with adjacent salt marsh and mud banks. Numerous individuals were flying around close to the sand and landing on it, and several pairs were flying in copula. One female was taken with prey, an otitid fly, *Chaetopsis fulvifrons* (Macq.). The fly is carried beneath the wasp during flight." This reference to pairs in copula may be significant in the light of the rather extraordinary mating behavior outlined above.

Previously published notes on nesting behavior in American species were based on *O. uniglumis quadrinotatum* Say, a relatively common form. Peckham and Peckham (1898), Parker (1915), and Williams (1936) have given similar accounts. The habits of *quadrinotatum* appear to differ from those of *sericeum* in several important details. First, the nest entrance is closed each time the female leaves in search of prey. Secondly, the prey is carried impaled on the sting. Thirdly, a variety of flies are utilized, including therevids, anthomyiids, calliphorids, sarcophagids, and muscids. Fourthly, no mention was made of mating habits, which were presumably unobtrusive. Ferton (1902), referring to European species, postulated that *Oxybelus* which carry the

prey impaled on the sting cover the nest entrance on going out, whereas those which clasp the prey by means of their hind legs leave the entrance open. *O. sericeum* obviously belongs in the latter category. More noteworthy are the unusual mating habits with frequent copulation and defense of the nest by the male.

Literature Cited

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NEW NAMES IN THEREVIDAE AND BOMBYLIIDAE
(Diptera)

In the July 1959, number of Pan-Pacific Entomologist I proposed the name *nana* for the preoccupied *Thereva pygmaea* Cole (1923). I succeeded in setting up another homonym — this time a name preoccupied by *Thereva nana* Fallén (1820, Dipt. Suec. Rhizom., 4.4), now in the genus *Catharosia* of the Tachinidae. I propose the name *nanella*, with a hope for final stability.

I am informed by Dr. R. H. Painter that *Villa arenicola* Cole (1923, Proc. Cal. Acad. Sci.) is preoccupied by *Villa lateralis arenicola* Johnson (1908, Psyche, XV, p. 14), described as an *Anthrax*. I propose the name *psamminus*, from the Greek, "of the sand."—Frank R. Cole, *University of California, Berkeley*.